



Bulletin 1774 PLC Programmable Controller



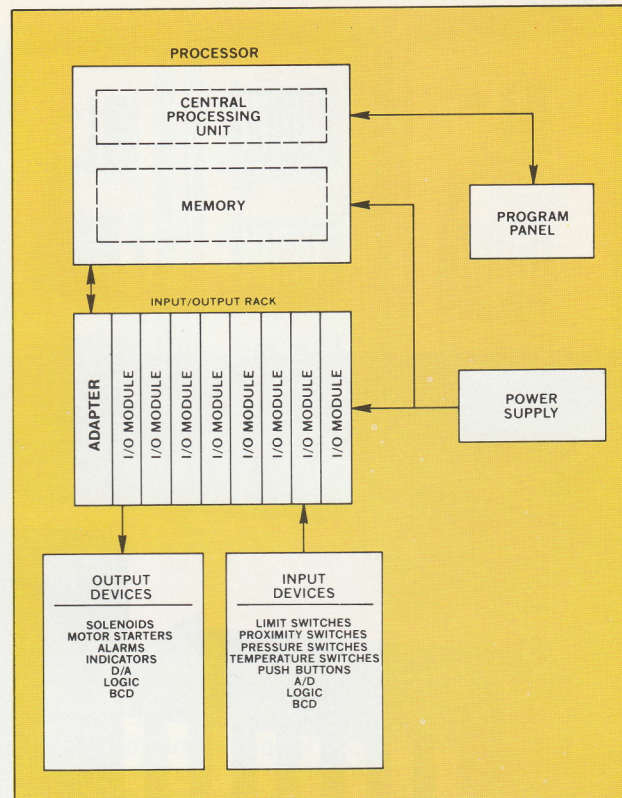
Today's use of Programmable Controllers by virtually every major industry indicates the wide acceptance of PC's in many diversified applications. The Programmable Controller offers this adaptability and flexibility through modular design and its inherent programmability. Bulletin 1774 PLC provides such control to a wide range of applications using standardized hardware and simplified program generation.

Definition of a programmable controller

The basic function of a Programmable Controller (PC) is to provide output commands, to a machine or process, that are based on some combination of input conditions received from the machine, the process or other related conditions. In this respect, the PC is very much like the familiar relay logic panel or solid state control system, but with additional capabilities.

The internal wiring of the PC is fixed and the logical functions it must perform in a given application are programmed into its memory, hence the name, Programmable Controller. A Processor, with built-in routines, scans the incoming (input) signals and in accordance with the program stored in memory initiates corresponding output signals.

If the design of the PC allows it, and the PC stored program provides it, the Programmable Controller may also perform timing, counting, data manipulation and arithmetic operations. With capabilities such as these the PC resembles a small computer, but with several distinctive advantages which include the ability to operate within an industrial environment, to interface directly with machine control devices. Also it may be programmed using simple machine or process oriented functions.



Typical applications

The PLC is supplied in numerous configurations made possible by the wide range of optional features available for applications in many diversified industries. Typical installations include food processing, petroleum and chemical processing, machine tools, material handling, water and waste treatment, automated packaging and assembly, welding machines, measurement and gauging equipment, injection molding, automated testing, and energy management systems.

Such installations and applications are currently in operation not only in the US and Canada, but in many overseas countries as well.



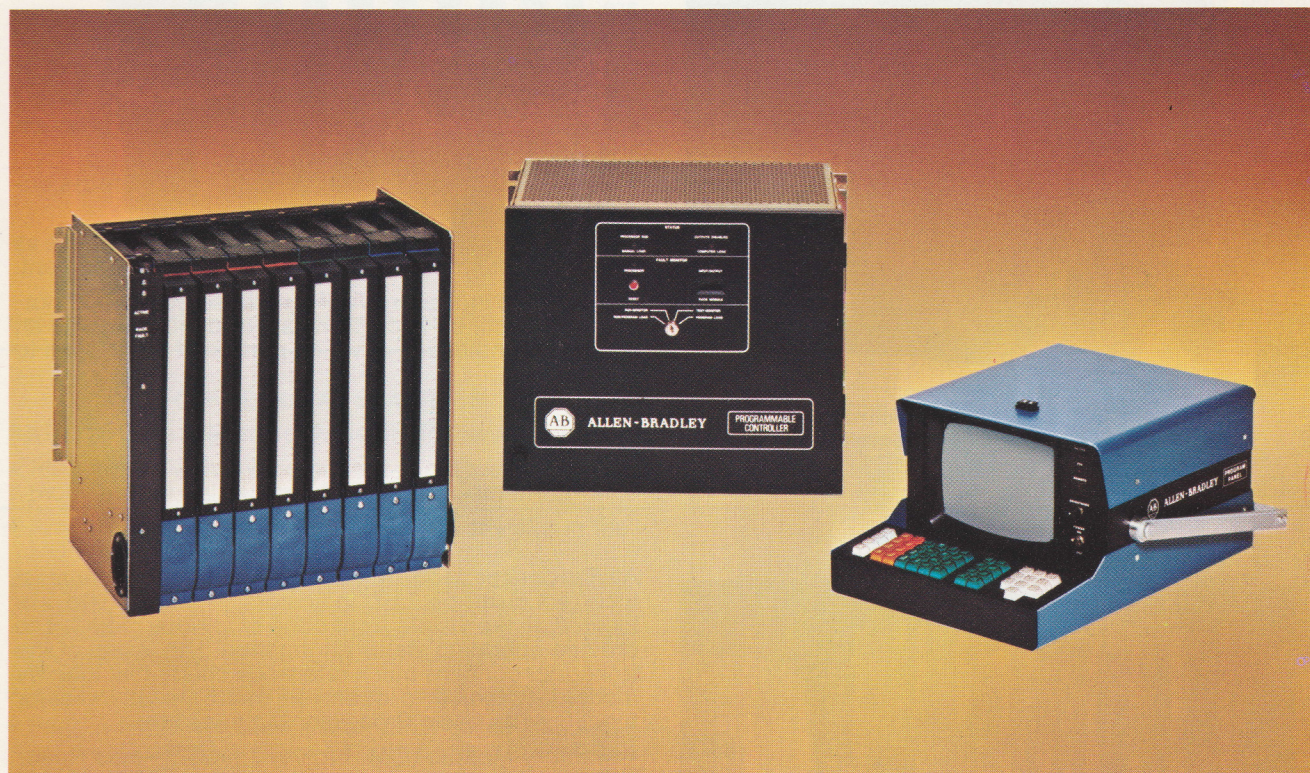
Bulletin 1774 PLC

Allen-Bradley's Bulletin 1774 PLC Programmable Controller is designed to provide high reliability in industrial applications. To achieve reliable performance of the controlled operation, a system of built-in self checks constantly monitors internal operation.

The PLC Processor contains a Read/Write memory, which is programmed in an easily understood ladder diagram format. Program entry, monitoring, and editing

are done through a portable Program Panel containing both a keyboard and CRT display.

The Input/Output (I/O) design utilizes up to 8 I/O Racks, each rack accommodating up to 8 I/O Modules with up to 16 terminals each, providing a maximum of 1024 input/outputs. By use of the remote system feature, each I/O Rack may be located up to 5,000 cable feet from the Processor.



System description

Bulletin 1774 PLC consists of three basic assemblies:

- The Processor which contains the central processing unit and memory
- The Input/Output (I/O) Rack (or Racks)
- The Local Power Supply

All the electronics, including the memory and I/O circuits, are contained on printed circuit modules which are easily accessed for installation or removal. Status indicators on the door of the Processor and also on the visible front edge of the Processor modules verify proper operation or indicate fault conditions.

The I/O Rack utilizes swing arms which provide quick disconnect to the I/O Modules without disturbing external wiring to the I/O connections. The I/O assemblies have indicators on each I/O terminal, which are visible

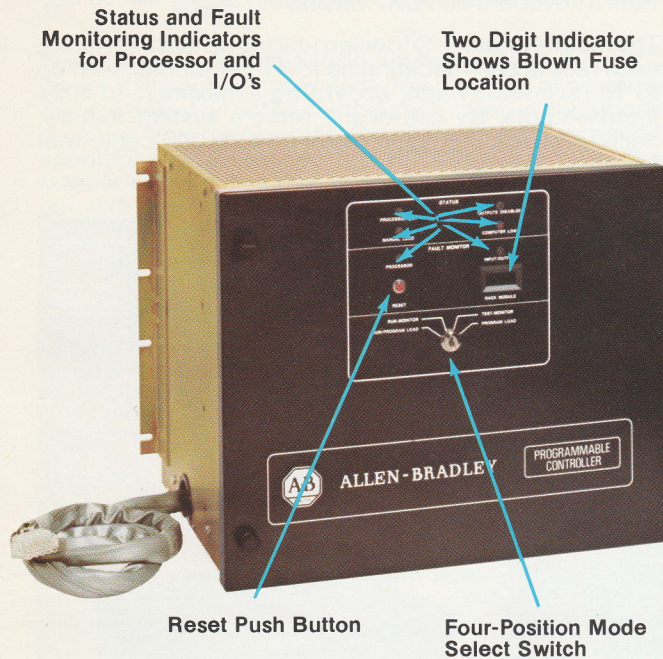
during operation, to display continuously the status of the I/O interface.

External devices are wired to the I/O Modules through a built-in wire duct which is accessible through either side of the I/O Racks.

The Local Power Supply serves the Processor and up to four I/O Racks. Additional racks, or remotely located racks, require additional power supplies.

Program generation is done through a portable Program Panel containing a keyboard and CRT. The program is entered and displayed in ladder diagram form. Search, edit, and monitoring functions are readily performed through the Program Panel. Programs may also be entered through other optional devices which include teletype, tape cassette and computer.

The PLC processor

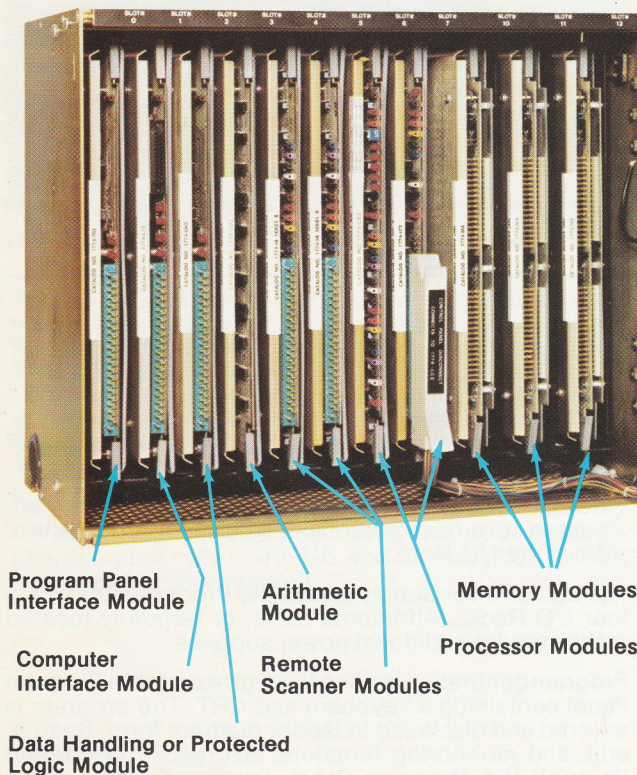


The Processor is self-contained in an enclosure that accommodates all the logic modules of the controller and provides a control panel for operation and status display.

The control panel on the Processor door includes a four-position Mode Select Switch. The four positions are:

- Program Load—Outputs are disabled and program may be edited or a new program entered by use of a Program Panel.
- Test-Monitor—Outputs are disabled but the program is operating.
- Run-Monitor—Normal operation with outputs enabled and program running.
- Run/Program Load—Currently functions the same as the Run-Monitor, but allows for future development.

Other status indicators verify mode selection and normal operation, or if certain faults occur, provide an immediate indication of which portion of the system to investigate.



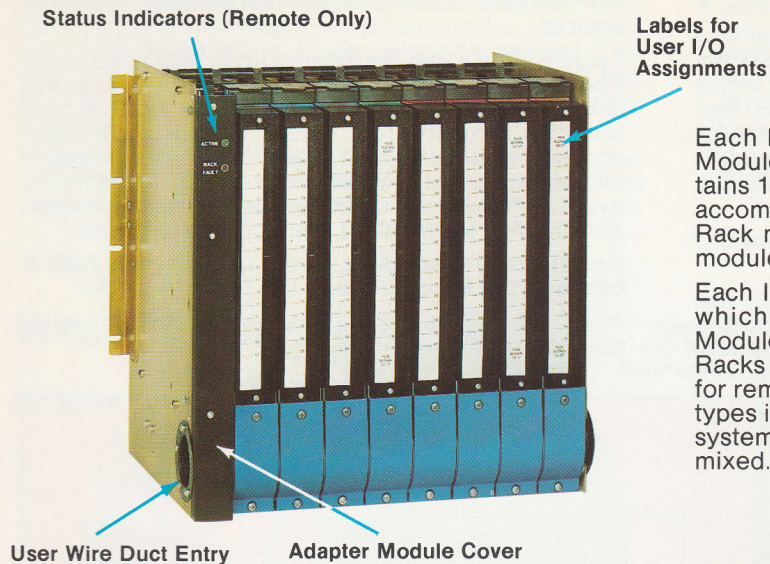
All Processor Modules are keyed to guard against incorrect insertion. LED indicators, as appropriate, are located on the visible front edge of various modules to provide operating status information. The inside of the front door contains quick reference charts that identify module location and describe each status indicator function. The basic Processor Modules are:

- Memory Module (Cat. No. 1774-MA)—Has Read/Write capability and storage capacity of 4K (4096) words of 16 data bits.
- Two Processor Modules (Cat. No. 1774-LB2, LC2)—One contains the integrated circuit logic for the memory clock, program counter, interrupt logic, decision and test logic. The other provides the circuit logic for the PLC instructions.
- Scanner Module (Cat. No. 1774-SL)—Controls the data transfer between the Processor and the I/O Modules.

Other modules that may be added are:

- Program Panel Interface Module (Cat. No. 1774-TB2)—Allows the optional Program Panel (Cat. No. 1774-TA) to be used.
- One or two additional Memory Modules (Cat. No. 1774-MA)—Provide a memory capacity of 8K (8192) words or 12K (12,288) words.
- Computer Interface Module (Cat. No. 1774-CI2)—Allows interfacing the PLC into a computer control or supervisory system.
- Arithmetic Module (Cat. No. 1774-LD2)—Adds the four basic arithmetic functions to the Processor operation (+, −, ×, ÷).
- Data Handling Module (Cat. No. 1774-DH2)—Handles groups of machine or process operating data and initiates printed reports for use with any RS-232-C (Electronic Industries Association Standard) compatible keyboard/printer.

PLC input/output



Each I/O Rack contains locations for up to 8 I/O Modules. Each module, unless otherwise specified, contains 16 inputs or 16 outputs. Thus, each I/O Rack accommodates up to 128 I/O terminal points. An I/O Rack may have any combination of input or output modules.

Each I/O Rack also contains an I/O Adapter Module which controls the data transfer between the I/O Modules and the Processor. Two different types of I/O Racks are available—one for local operation and one for remote operation. The difference between the two types is the adapter module and cover. In a given PLC system, remote and local I/O Racks may not be intermixed. All racks must be either remote or local.

I/O MODULE ASSEMBLIES

All I/O Module assemblies have the following features:

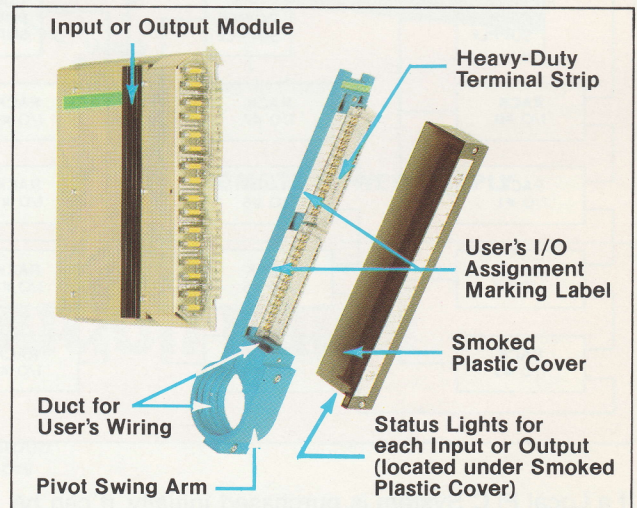
- Plug-in type with pivot arm front panel providing easy module removal without disturbing user wiring.
- Any I/O Module may be plugged into any slot in the I/O Rack.
- User wiring to module is through a heavy-duty terminal strip. Pressure-type screw terminals are used to provide fast, secure wire connections. Built-in wire ducts keep user wiring neat and in place.
- Status Lights for each input or output are provided.
- Plug-in fuses are supplied on most output modules for overload and short circuit protection of the output switch.
- Blown fuse indicators for most output modules.
- Optical isolation between power and logic signals.

Input Modules—Convert AC or DC input signals from push buttons, limit switches, etc. to PLC logic levels.

- AC/DC Input (Cat. No. 1778-IA) for input devices which operate at 120V AC, 60/50 Hz or 120V DC.
- AC (240 volts) Input (Cat. No. 1778-IM) for input devices which operate at 240/220V AC, 60/50 Hz.
- DC Input (Cat. No. 1778-IB, IC) for 12 to 24, or 48V DC operation.
- Isolated AC Input (Cat. No. 1778-ID) provides isolation required for twelve 120V AC or twelve 120V DC input signals.
- TTL (5 volts DC) Input (Cat. No. 1778-IG) for transistor-transistor logic (TTL) compatible with input devices such as solid state control and measuring equipment.
- Analog Input (Cat. No. 1778-IE, IF) accepts analog signals within a variety of signal ranges and converts to a three digit (BCD) value. Single-ended and differential versions are available.

Output Modules—Convert PLC Logic signals into AC or DC signals to drive loads such as motor starters, solenoids, etc.

- AC Output (Cat. No. 1778-OA) for output devices operating at 120V AC, 60/50Hz.



- AC (240 Volts) Output (Cat. No. 1778-OM) for output devices operating at 240/220V AC, 60/50 Hz.
- DC Output (Cat. No. 1778-OB, OC) for 12 to 24, or 48V DC operation.
- DC Power Output (Cat. No. 1778-OH, OK, OL) for operating heavy-duty clutches, brakes, solenoids, often used in the machine tool industry. Three DC voltage ranges available; 12 to 24, 48, and 125V DC.
- Isolated AC Output (Cat. No. 1778-OD) provides eight isolated outputs, capable of switching 120V AC power to output devices such as motor starters, solenoids, etc.
- TTL (5 Volts) Output (Cat. No. 1778-OG) provides transistor-transistor logic (TTL) compatible output circuit for operating 5V DC level electronic devices or systems.
- Analog Output (Cat. No. 1778-OE, OF) converts a three digit BCD number into an equivalent analog signal output available over a variety of different analog voltage and current ranges.
- Pulse Output (Cat. No. 1778-OJ) provides output interfacing compatible with most stepper motor translators.

Types of input/output systems

The PLC offers two types of Input/Output Systems:

- **Local I/O System**—I/O Racks are located relatively close to the Processor, the first rack up to 15 feet from the Processor and a full system of 8 I/O Racks series connected in a "Daisy Chain" extending up to 80 feet maximum. This is the conventional arrangement for many control system applications where input and output devices are located relatively close to the Programmable Controller.

Communication between the Processor and I/O Racks is parallel transmitted.

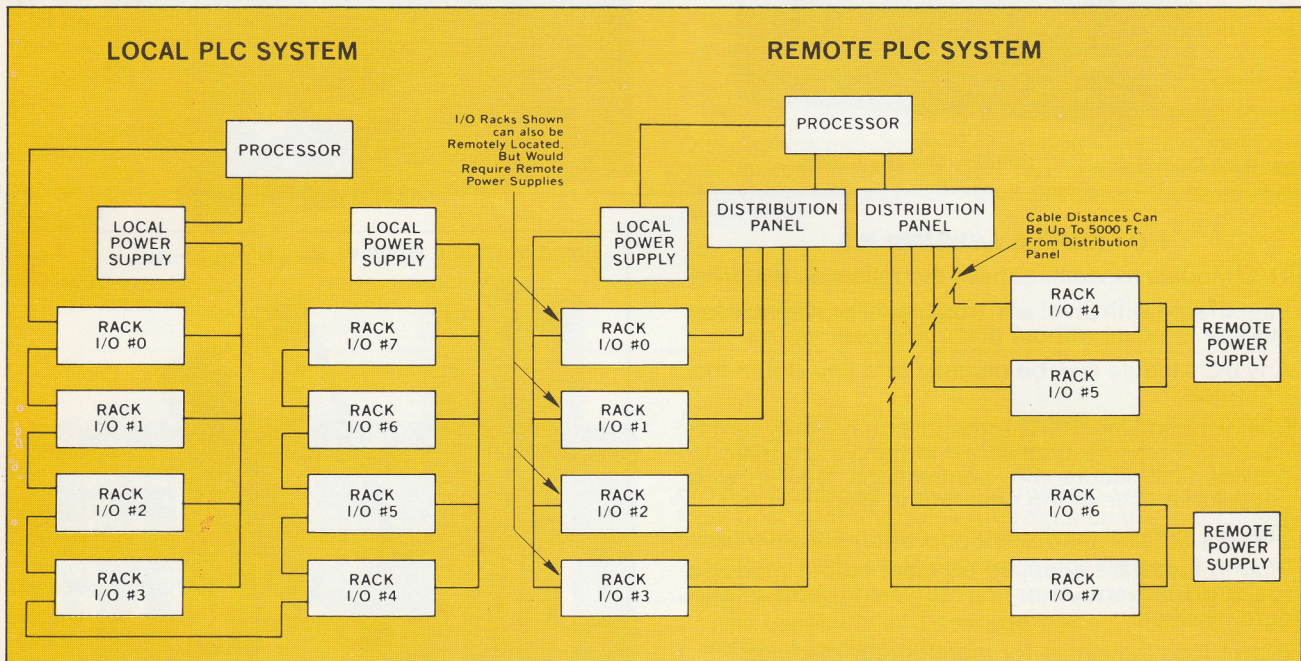
- **Remote I/O System**—A major advantage of the Remote I/O System is that I/O Racks may be located close to the input and output devices thereby reduc-

ing installation costs of cable runs between racks and devices.

Each I/O Rack may be located up to 5000 cable feet from the Processor. The Remote Racks are connected to a Distribution Panel at the Processor location by a four-conductor shielded cable. Each Remote Rack contains status and fault indicators. Zone programming technique allows isolation of I/O Racks in the event of monitored component or device failures and also permits segmenting of a complex program.

Serial transmission is used in communication between the Processor and the Remote Racks.

All I/O's are scanned and up-dated at a rate of 10 milliseconds or less.



If a Local PLC System is purchased initially, it can be converted into a Remote System at a later date by adding:

- Remote I/O Distribution Panel (Cat. No. 1774-SD) which accommodates up to four Remote I/O Racks. Two Distribution Panels are required for a full PLC System of eight Remote I/O Racks.
- Half-Scanner Module (Cat. No. 1774-SR) replaces the Scanner Module (1774-SL) which is used on the Local System. Each Half-Scanner Module accommodates one Remote I/O Distribution Panel. Therefore,

a full system of eight Remote I/O Racks and two Distribution Panels will require two Half-Scanner Modules.

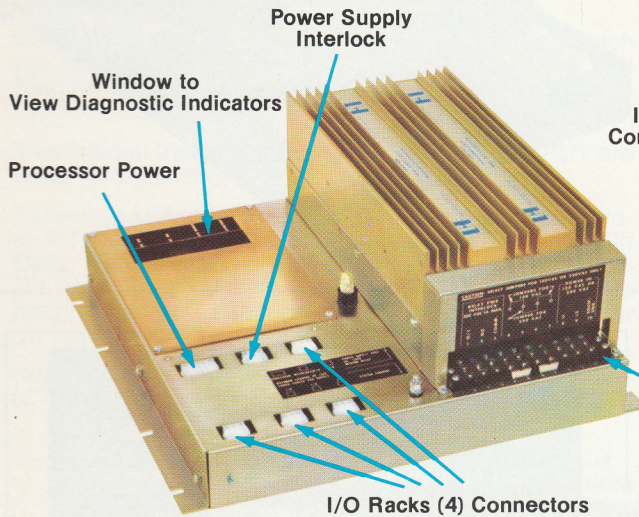
- Remote Power Supply (Cat. No. 1778-P2) is required for Remote I/O Racks located up to 5000 feet from the Processor. One Remote Power Supply will serve two I/O Racks if both Racks are within eight feet of the supply.
- Remote I/O Rack Adapter Module (Cat. No. 1778-AR) and Cover (Cat. No. 1778-AH) replace the I/O Adapter Module and Cover used in a Local I/O Rack.

Power supplies

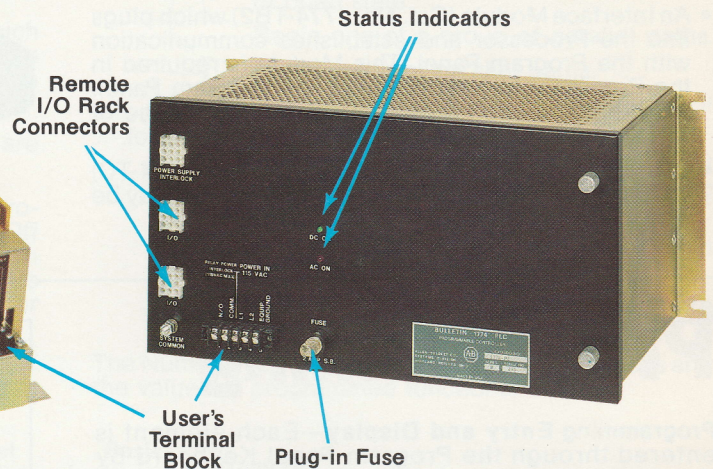
The Processor and up to four I/O Racks may be driven by the Local Power Supply. If more than four I/O Racks are used, an additional Power Supply is needed. The Remote Power Supply will handle a maximum of two I/O Racks. Both the Local and Remote Power Supply provide:

- Automatic shutdown of PLC System whenever over-voltage, overcurrent, and/or undercurrent conditions are detected at the outputs.

- Monitoring of incoming AC line voltage for proper levels. If line voltage drops below minimum rated level for more than one-half cycle, power supply automatically shuts down and stays off until proper level returns.
- Terminals for customer use to indicate a shutdown or to control an external function during a power supply shutdown.

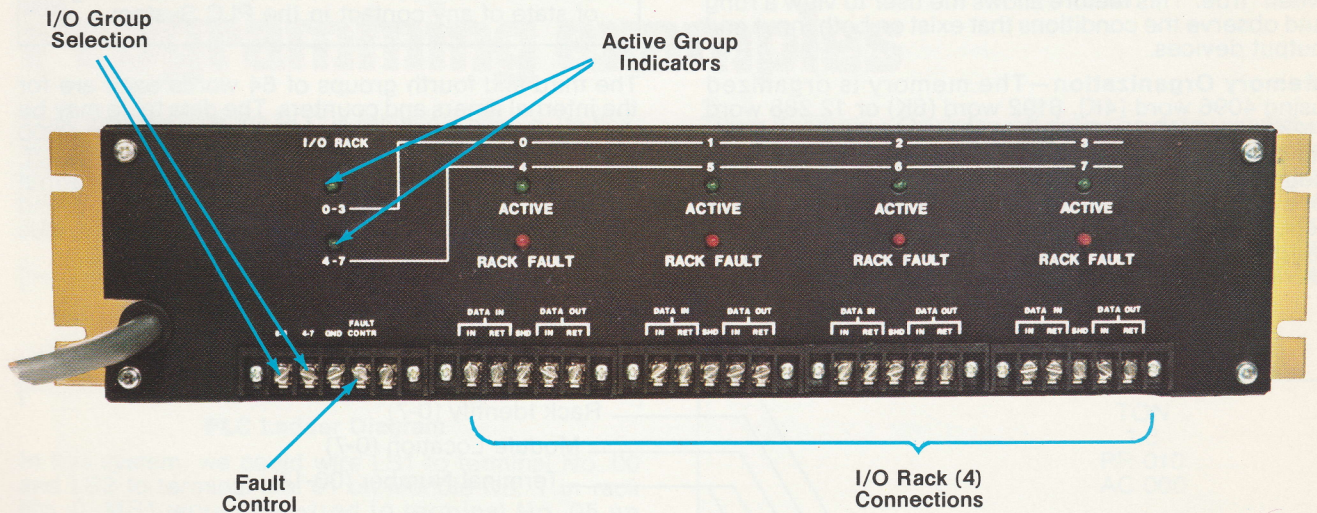


LOCAL POWER SUPPLY



REMOTE POWER SUPPLY

Remote I/O distribution panel



In the Remote I/O System, up to four I/O Racks are connected to Distribution Panel by a four-conductor shielded cable. The group of I/O Racks, Racks No. 0-3 or Racks No. 4-7, are selected by a jumper wire from the 0-3 terminal to ground or 4-7 terminal to ground

respectively. The fault control terminal, shown on the distribution panel, allows shutdown of the entire PLC System should a monitored fault occur in any of the I/O Racks. The fault control feature is selected by a jumper wire from the fault control terminal to ground.

Program panel

The PLC Program Panel option capability utilizes three distinct assemblies:

- The PLC Program Panel (Cat. No. 1774-TA) is a portable, lightweight unit which provides a fast and easy means of program entry, editing or monitoring. The keyboard provides for all programming elements and the CRT gives a visual display of each rung of the ladder diagram program. The CRT displays up to nine contacts in series with one output per rung and up to five levels of branches (9 x 5 matrix).
- An Interface Module (Cat. No. 1774-TB2) which plugs into the Processor and establishes communication with the Program Panel. This Module is required in the Processor to interface with the Program Panel. Plug-in connection is made from the front edge of this Module to a connector on the Program Panel.
- The 15 foot Interconnect Cable, (Cat. No. 1774-TC) which is a four-conductor shielded cable, that may be optionally increased up to 5000 feet by a user.

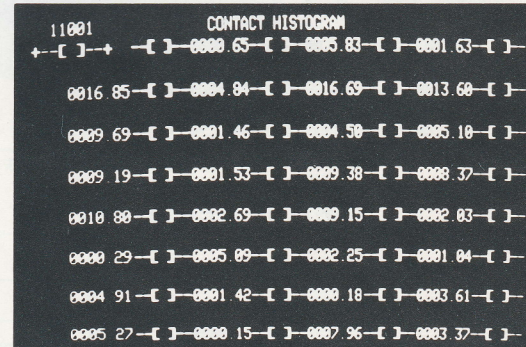


Programming

Programming Entry and Display—Each element is entered through the Program Panel Keyboard by depressing the selected element key and the numeric keys for addresses and values. As each element is entered, it is added to the visually displayed ladder diagram. The display always shows where the next entered element will appear.

Editing capability allows any rung to be corrected without having to totally re-enter it. Also, new elements may be inserted into a rung, or new rungs may be inserted at any place within the ladder diagram. The editing capability can be performed at any time in the Program Mode. Once programmed, any rung can be displayed. All elements of a rung shown on the CRT are intensified when "true." This feature allows the user to view a rung and observe the conditions that exist on both input and output devices.

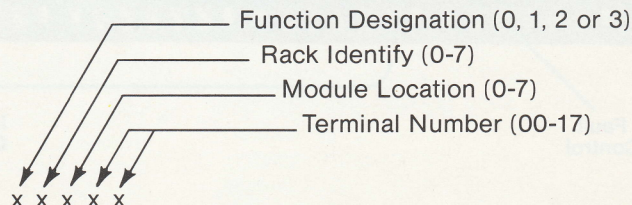
Memory Organization—The memory is organized using 4096 word (4K), 8192 word (8K) or 12,288 word (12K) capacity. Word length is 18 bits-16 data and 2 bits for parity. The first 256 words of memory (through octal address 377) are referred to as the Data Table. The image portion of the data table reflects the status (energized or de-energized) condition of the inputs and outputs. The first 64 words are reserved for output devices and the second 64 words are for input devices.



Histogram—A contact histogram may be displayed on the CRT, at anytime in any mode, to indicate the elapsed time since the last change of state of any contact in the PLC System.

The third and fourth groups of 64 words each are for the internal timers and counters. The data table may be optionally expanded up to word address 1000 or 2000 (octal) to provide more capability for the GET, PUT, LESS THAN, and EQUAL TO instructions of the central processor and the ADD, SUBTRACT, MULTIPLY, and DIVIDE, instructions of the Arithmetic Module, plus other data manipulations.

Address—Each program element is addressed by a 5-digit octal address as follows.



5 Digit Address

Examples—

- Address 01206
 - 06 Terminal number 6
 - 2 Module Slot 2
 - 1 Rack number 1
 - 0 Signifies an output function

- Address 13614
 - 14 Terminal number 14
 - 6 Module Slot 6
 - 3 Rack number 3
 - 1 Signifies an input function

Programming functions

The Control Function keys marked TTY, DISPLAY, CLEAR MEMORY, and CANCEL COMMAND are used for establishing communication with the Processor or a Teletype hook-up mode, to clear processor memory, and for cancelling a programming command.

The Editing keys allow removing or inserting a rung or element, sequencing "UP" or "DOWN" the ladder diagram, searching (or locating) a specific element in a ladder diagram, or moving position indicator to the right or left on the CRT.

The Arithmetic Option uses these four functions which are standard on each program panel. To have this feature, an optional Arithmetic Module is installed in the Processor.

The Special Instructions, GET, EQU, LES, and PUT are used for transferring and comparison of data.

Timers and Counters for internal timing functions provide Timer On Delay (on energization)-(TON), Timer Off Delay (on de-energization)-(TOF), Retentive Timer On Delay (RTO), and Retentive Timer Reset (RTR). Timers are programmed in increments of 1.0 or 0.1 seconds for periods up to 999 or 99.9 seconds respectively.

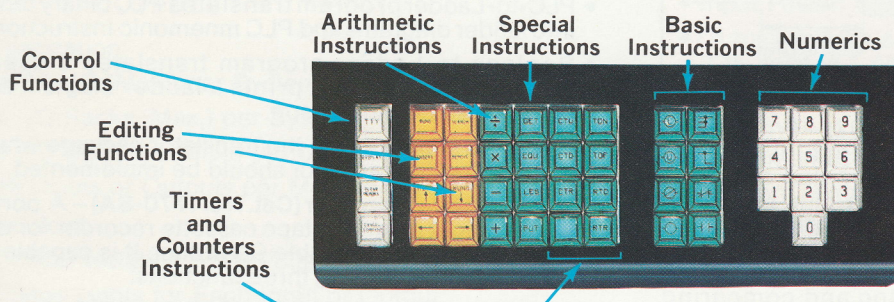
Internal Counters are available using the Up Counter-(CTU), Down Counter (CTD), and Reset Counter-(CTR)

which provide count up, count down or reset, respectively, as program conditions are met. Counters count up and/or down in increments of 1 and energize the output when the accumulated value reaches the preset value from 1 to 999.

The Eight Basic Instructions are:

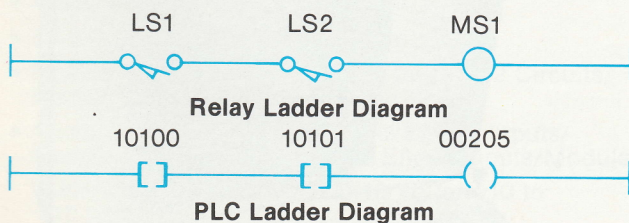
-  Examine an I/O point for the energized or closed state.
-  Examine an I/O point for the de-energized or open state.
-  Begin one of a group of parallel paths.
-  End a group of parallel paths.
-  Turn on an output if all conditions for it are true.
-  Turn off an output if all conditions for it are true. (Condition opposite of turning on.)
-  Unlatch an output if all conditions for it are true. (Held until latched.)
-  Latch an output if all conditions for it are true. (Held until unlatched.)

The Numeric Keys are used for entering addresses and the values of programmed functions.



Programming examples

Programming with the PLC is relatively simple. Its flexibility allows the user to program in PLC ladder diagram directly from relay ladder diagram or Boolean equations. For example:

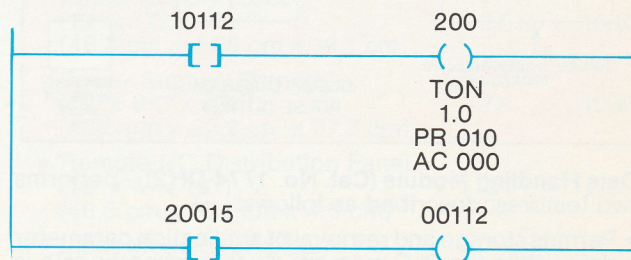


In this system, we could wire LS1 to terminal No. 00 and LS2 to terminal No. 01 on module No. 1 in rack No. 0. MS1 would be wired to terminal No. 05 on module No. 2 in rack No. 0. The PLC addresses would be as follows:

Device	PLC Addresses
LS1	10100
LS2	10101
MS1	00205

(Note that the most significant digit in the PLC address identifies the function: 1 for input device, 0 for output device.)

Timer Example—On delay, off delay, on delay retentive and retentive timer reset can be programmed using the internal timers. Shown is an on delay timer (TON) preset (PR) to time out after 10 seconds, when input 10112 is energized. The value (AC) indicates the accumulated time. Upon timing out, the timed contact 20015 will be energized, energizing a device with address 00112, which can be a pilot light or some other device.



Programming counters is very similar to this timer example.

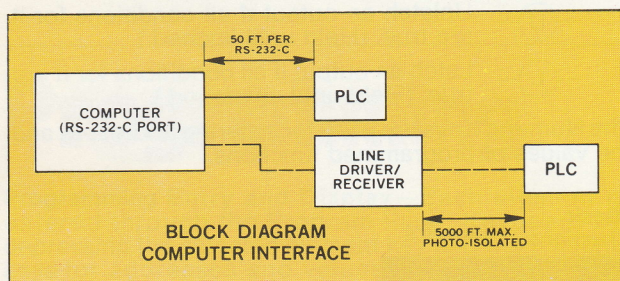
Additional capability

Computer Interface Module (Cat. No. 1774-CI2)—Is a module that plugs directly into the PLC Processor and provides a RS-232-C standard interface for direct communication of the PLC with a host computer for monitoring or control. Selectable modes of operation allow several levels of access from the computer to the PLC:

- Program can be loaded into PLC memory from computer.
- A copy of program can be loaded into computer from PLC memory.
- Computer can monitor the PLC I/O points and control the outputs.

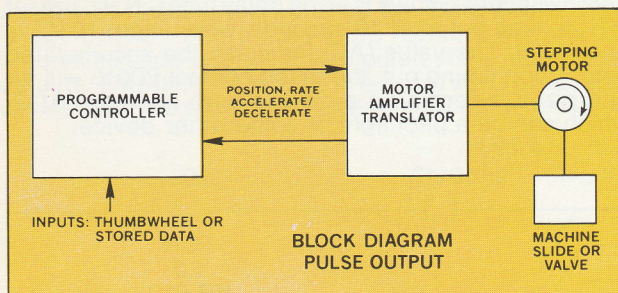
Cable distances from 50 to 5000 feet require a Line Driver/Receiver (Cat. No. 1774-D2 or -D6) at the computer location.

The communication protocol is ANSI standard X3.28-1971.



Arithmetic Module (Cat. No. 1774-LD2)—Provides the PLC with four-function arithmetic capability allowing addition, subtraction, multiplication and division of three-digit decimal numbers. Three-digit results are given for addition and subtraction functions and six-digit results for multiplication and division functions. The arithmetic feature gives the PLC system capability for such applications as weighing and comparing, adjusting to formula, calculating, etc.

Pulse Output Module (Cat. No. 1778-OJ)—Provides interfacing that is compatible with most stepper motor translators. Its primary function is to accept a given set, of PLC programmed instructions, that reflects distance, rate and direction commands and output a pulse train corresponding to those commands to a stepper motor translator.



Data Handling Module (Cat. No. 1774-DH2)—performs two features, described as follows:

- Permits storage and retrieval of application parameter data within the PLC memory. Such parameter data is used for the preset conditions for the operation of various types of machinery which require a number of sets of "recipe" type information from which variation in machine operation can be determined.

This information is organized in data files. Each file can contain up to 45 three-digit (BCD) values and each file is given a file number for identification purposes. Data files are stored in the unused application program area of the PLC memory. And memory not used by the application program is available for this purpose.

Initial entry, modification, and display of data files is accomplished by means of the PLC Program Panel in ladder diagram format. Information is entered into a group of 45 specified memory locations within the I/O image area.

- Report Generation, also a function of the Data Handling Module, provides the PLC capability of preparing printed reports which may include production summaries, operation status, alarm conditions and operator communication. The Module serves as the equipment interface to any RS-232-C compatible terminal device.

PLC Translator Package (Cat. No. 1774-W1)—A card deck or tape in Fortran IV to be used with a minicomputer such as an Interdata 7/16 having a 16 data-bit word. The translator is capable of the following:

- Ladder-to-PLC program generates a PLC binary tape from symbolic name/octal address assignments and ladder diagram format instruction as input.
- PLC-to-Ladder program translates PLC binary tapes into ladder diagrams and PLC mnemonic instructions.
- Boolean-to-Ladder program translates a user's Boolean equations and prints a ladder diagram and provides a PLC binary tape.

A manual is supplied with the translator package which explains how the translator should be implemented.

Digital Cassette Recorder (Cat. No. 1770-SA)—A portable lightweight magnetic tape cassette recorder for use with the PLC Programmable Controller. It is capable of performing the following three functions:

- Recording programs from the PLC memory.
- Loading programs into the PLC read/write memory.
- Verifying recorded and loaded programs stored within the memory.



Specifications

PROCESSOR

Organization:

- Basic Processor Contains: 1 Scanner, 2 Processor, and 1 Memory (4K) Modules
- Seven additional Slot Locations for Optional Modules

Memory:

- Type: Read/Write High-Temperature Magnetic Core
- Size: 4K, 8K, 12K

Operational:

- Scan Time: 2.5 Milliseconds (Average) per 1K of Utilized Memory
30 Milliseconds (Max.) for 1024 I/O System with 12K
- Clock Rate: 500 Kiloherzt for 4K Memory
1 Megahertz for 8K and 12K Memory
- Word Size: 16 Data plus 2 Parity Bits

Internal Functions:

- 63 Internal Timers and Counters (nominal)
- Data Transfer
- Data Comparisons

INPUTS/OUTPUTS

Organization:

- 1024 I/O (Max.) per System
- 8 I/O Racks (Max.) per System
- 8 I/O Modules (Max.) per I/O Rack
- 16 Inputs or Outputs per Module (Max.)

Electrical:

- Optical Isolation, 1500 Volts
- Status Lights for Each Input or Output
- Blown fuse indicators for most output modules.
- Overload and Short Circuit Protection of Most Output Modules Provided by Self-Contained Fuses

Types of Input Modules:

- 120V AC, 60/50 Hz, 120V DC
- 240/220V AC, 60/50 Hz
- 12-24V DC
- 48V DC
- 5V DC TTL (Transistor-Transistor Logic)
- Isolated 120V AC, 60/50 Hz, 120V DC, 12 Circuits/Module
- Analog: 16 Single/8 Differential Ended Inputs/Module, 8 Single/4 Differential Ended Inputs/Module
- Voltage Ranges: 1-5 Volts, 0-10 Volts, -10 to +10 Volts
- Current Ranges: 4-20 mA, 0-20 mA, -20 to +20 mA

Types of Output Modules:

- 120V AC, 60/50 Hz, 2 Amp Continuous
- 240/220V AC, 60/50 Hz, 2 Amp Continuous
- 12-24V DC, 500 mA Continuous
- 48V DC, 250 mA Continuous
- 5V DC TTL, 16 mA (Max.) Sink Current
- Isolated 120V AC, 60/50 Hz, 2 Amp Continuous
8 Circuits/Module

- 12-24V DC, 2 Amp Continuous
- 48V DC, 2 Amp Continuous
- 125V DC, 0.5 Amp Continuous
- Pulse Output:
0-9,999 pulses/sec. (rate)
0-99,999 pulses (position or burst length)
Selectable Acceleration/Deceleration Control
- Analog: 4 Outputs/Module, 2 Outputs/Module
Voltage Ranges: 1-5 Volts, 0-10 Volts, -10 to +10 Volts
Current Ranges: 4-20 mA, 0-20mA, -20 to +20 mA

POWER SUPPLIES

Local Power Supply:

- Powers One Processor and 4 I/O Racks (Max.)
- Input Power: 120V AC ($\pm 10\%$) 325 Watts
- Output Voltage and Current: 5 Volts at 30 Amps, ± 15 Volts at 6 Amps Each

Remote Power Supply:

- Powers 2 I/O Racks
- Input Power: 120V AC ($\pm 10\%$) 120 Watts
- Output Voltage and Current: 5 Volts at 6 Amps, ± 15 Volts at 1 Amp Each

GENERAL

Environmental:

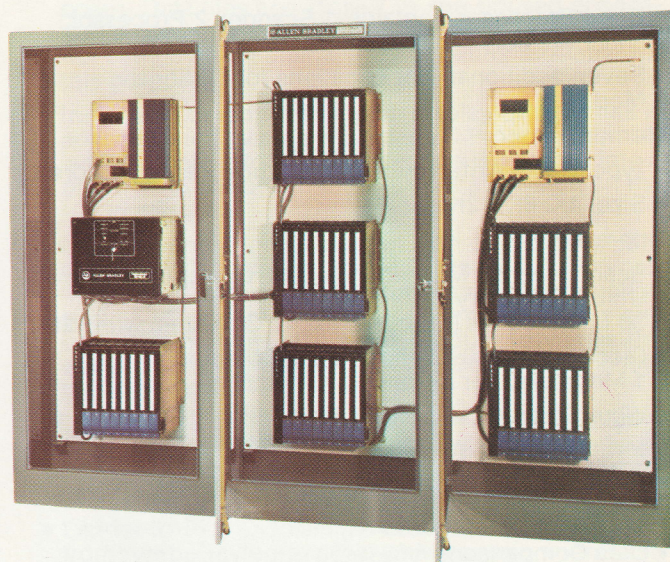
- Ambient Temperature (Operational): 0° to 60°C
- Ambient Temperature (Storage): -40° to 85°C
- Humidity: 5-95%, Without Condensation

APPROXIMATE DIMENSIONS AND WEIGHTS:

Dimensions (Width x Height x Depth)	Net Weight	
	(lbs)	(kg)
• Processor (w/Modules) (19" x 14½" x 12¾") (48.3 cm x 36.8 cm x 32.4 cm)	50	22.7
• I/O Rack (w/o Modules) (19" x 17½" x 13¼") (48.3 cm x 44.5 cm x 34.9 cm)	22½	10.2
• Power Supply (Local) (19" x 17½" x 7½") (48.3 cm x 44.5 cm x 19.1 cm)	37	16.8
• Power Supply (Remote) (19" x 8¾" x 10¾") (48.3 cm x 22.2 cm x 27.3 cm)	37	16.8
• Remote I/O Distribution Panel (19" x 4" x 1¾") (48.3 cm x 10.1 cm x 4.5 cm)	5	2.3
• Input Modules (Typical) (Fits Into I/O Rack)	3½	1.6
• Output Modules (Typical) (Fits Into I/O Rack)	4¾	2.2
• Program Panel (14" x 9½" x 21") (35.6 cm x 24.1 cm x 53.4 cm)	43	19.5

Bulletin 1790 assembled control systems

Allen-Bradley offers a customized service which provides mounting and wiring the Programmable Controller System, to your specifications, in a NEMA type 12 or other enclosure. Such systems could include operator's panels, viewing windows for status lights, special paint and graphic displays. Assembled systems may include relays, motor starters, transformers, disconnecting means, terminal blocks, etc., and other control devices as specified. Standard or special testing and documentation can also be provided. This service to our customers has been found to minimize design and debugging time, and also results in improved installations, less startup time and better overall reliability.



Product support

Quality Assurance—Allen-Bradley's adherence to a strict quality control program includes comprehensive testing of all PLC equipment prior to shipment. This testing includes a specified amount of "burn-in" time under simulated operating conditions which minimizes early component failures (common to solid state devices), and provides outstanding reliability.

Training—Allen-Bradley provides customer training courses at their Training Center in Highland Heights, Ohio. The courses include equipment specifications, operation, programming, troubleshooting and ample "hands on" experience for a thorough understanding of operation and applications of the controller. Training School schedules are published yearly. Maintenance courses at the customer's site are also available at standard rates.

Documentation—Allen-Bradley provides instruction manuals with every PLC which include system assembly and installation information. Product Data Sheets on all modules and accessories are also included in addition to operation, programming and maintenance instructions.

For Bulletin 1790 PLC Systems, a set of documentation is provided which additionally includes an input/output wiring diagram.

Field Support—Product application assistance by trained and experienced engineers is available for both program and system development and on-site problem solving.

Customer support is available through a network of field sales and support personnel located in key cities through the U.S. and internationally. Your local Allen-Bradley office can arrange for qualified service or assistance if needed. These support centers are also able to provide in warranty replacements.

Out-of-warranty service plans are described in the Repair Policy. These plans provide a means for a user to effect a part replacement and/or repair to his equipment at minimal cost.

Service—An extensive Field Service Department with experienced representatives stationed in key cities, provides both telephone consultation assistance and prompt on-site service at standard rates.

Product Warranty—A comprehensive product warranty applies to all Allen-Bradley control systems to provide your after-the-sale satisfaction.

At Allen-Bradley, our quality, service, and support programs are as much a part of our product line as the control systems we supply.



ALLEN-BRADLEY

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